

### Speed of Light Worksheet

1. Under a red light, what color will a white binder appear?
2. If an object appears green in pure white light, what color will it be under pure blue light?
3. A group of light rays makes up a \_\_\_\_\_.
4. How can you tell if an object is luminous or illuminated?
5. The star Sirius is 8.7 light years away. What does this mean?
6. If Sirius vanished today, when would we notice?
7. Imagine an astronomer on a planet near Sirius has a telescope trained on us. What would she see?
8. Would an astronomer near Proxima Centauri, 4.3 light years away, see the same thing?
9. Radio waves travel the same speed as light in empty space or in air. How long does it take a radio signal to travel from New York to San Francisco, 4800 km?
10. A radar transmitter receives a reflection of its radio wave from the moon 2.70 s after the signal is sent. What does this experiment give us as the distance between the earth and the moon?
11. To determine the speed of light using the two lantern approach, what time interval would the person originating the light signal need to be able to measure to arrive at the correct value for the speed of light? Assume that the lanterns are 1.00 km apart
12. The earth is 8.33 light minutes from the sun. How many kilometers is this?
13. How long would it take a phone call to reach Mars? Earth and Mars are  $8.0 \times 10^{10}$  m apart.
14. How long would it take sunlight to reach Pluto. Pluto is  $5.9 \times 10^9$  km from the sun.
15. If light takes 138 s to reach Venus from the Earth, how far apart are they?
16. The Earth is  $9.18 \times 10^7$  km from Mercury. How long does it take for radio waves to travel between the two planets?
17. If the Earth established a colony on Neptune it would take 4.03 hours for a radio signal to reach the colony.
  - a) How far is the colony from the earth?
  - b) What time does News at six start?
18. Using the answers to previous questions determine how long it would take radio waves to travel from Pluto to Neptune.
19. If Jupiter is  $7.783 \times 10^8$  km from the Sun, how long does it take sunlight to reach Jupiter?
20. An astronomical unit, AU, is the distance from the earth to the sun. How far is it from the Earth to Pluto in AU?
21. How far is it, in m, to Barnard's Star 1.83 parsecs away?
22. How many parsecs is it from the earth to Sirius?
23. Epsilon Indi is 3.44 parsecs away. How long will it take a radio signal to get there?
24. Io is  $4.22 \times 10^5$  km from Jupiter and Europa is  $6.71 \times 10^8$  m from Jupiter.
  - a) What is their maximum and minimum separations?
  - b) How long will it take a radio signal to travel between the two moons? Give 2 answers.